IV. TECHNICAL SESSIONS

SESSION 1 – FUTURE FLEET PREDICTIVE CAPABILITY

CHAIR
Mark Pointon, U.S. Army Corps of Engineers, Institute for Water Resources

Ian Mathis, U.S. Army Corps of Engineers, Institute for Water Resources

COORDINATOR
Phillip Thorpe, U.S. Army Corps of Engineers, Institute for Water Resources

TITLE OF PRESENTATIONS AND SPEAKERS
"International Trade Forecasting" by Robert West, DRI-WEFA

"Future Fleet Predictive Capability: NDNS Fleet Forecast Update" by Michael Sclar, Michael L. Sclar Associates, Inc.

"Future U.S. Vessel Constraints" by Phillip Thorpe, U.S. Army Corps of Engineers

SUMMARY
International Trade Forecasting.
In his presentation, Mr. Robert West emphasized the importance of understanding cargo movements in order to predict fleet demand. His organization developed a unique data set covering bilateral, global trade defined by 54 countries and 16 regions. He reviewed several charts which project the annual growth of total container trade and sea borne imports by coast, until the year 2020. He also provided information on gulf exports and top ten exported goods for 2001.

Future Fleet Predictive Capability: NDNS Fleet Forecast Update
Mr. Michael Sclar provided an informative presentation on the latest NDNS fleet forecast, an update of the 1996-based system using a year 2000 base which identifies historical trends and provides a current capability for predicting future fleets and port and terminal requirements. Its objective is to develop a forecast of trade and vessel calls by vessel type and size by port, trade partner region, and commodity to support port project planning and evaluation. Mr. Sclar discussed the fleet forecast procedures, data sources, and database dimensions. He also provided sample analyses, showing charts from years 2000 through 2050 with data such as total exports and imports; exports by region; and import container tons.

Future U.S. Vessel Constraints
Mr. Phillip Thorpe started his presentation by outlining the objectives and accomplishments of the National Dredging Needs Study, which provided an assessment of the future national waterside infrastructure needs. He then displayed several charts to show the tonnage and value of U.S. trade by world region and coast; distribution of dry bulk and containership vessels; forecast of annual vessel calls on various coasts; and the constrained vessel calls with and without Corps projects. International trade is expected to grow by 4-5 percent annually – this growth will cause increased congestion and industry consolidation. Industry consolidation

will result in larger vessels and traffic consolidation (hub ports), requiring deeper channels and increased port capacity.

SESSION 2 – NAVIGATION AND INFORMATION SYSTEMS 1

CHAIR
Rudy Peschel, Saab Transponder Tech

COORDINATOR
Athar Pirzada, U.S. Coast Guard

TITLE OF PRESENTATIONS AND SPEAKERS
"Development and Implementation of Coastal AIS Network Concepts, with MTS Implications" by Magnus Nyberg, Saab Transponder Tech

"Intelligent Waterway Systems (IWS)" by Jay Spalding, U.S. Coast Guard

"The United States ENC Program of the Coast Survey" by Mike Brown, National Ocean Service, NOAA

"Prospect for PORTS" by Kathryn Bosley and Mark Bushnel, National Ocean Service, NOAA

"Linking Risk Assessment of Marine Operations to Safety Management in Ports" by Vladimir Trbojevic, EQE International Ltd.

SUMMARY
This first session of Navigation Information Systems introduced a combination of proven and burgeoning technologies that offer disparate collection opportunities, but insufficient in number and scope to provide integrated solutions. Each, however shows advancement and greater potential to gather data for user exploitation and exchange, thereby contributing to the safety and productivity benefits of systematic marine transportation as a mode. Risk management was introduced as a means of significant improvement to MTS performance, with a need for input data from a greater variety and scope of sources than the Information Systems as presented, further pointing the need for comprehensive strategic planning that would enhance component development, and therefore synergy.

<u>Development and Implementation of Coastal AIS Network Concepts, with MTS Implications</u>
Marcus Nyberg's presentation addressed shore based AIS network implementations and, as an example, showed the implementations in the Baltic Sea area. It has long been realized that an automatic reporting device (transponder) fitted on a ship/airplane (mobile station), could be beneficial to the safety of navigation and the control and monitoring of the maritime environment. An automatic reporting system called the Automatic Identification System (AIS) has been adopted by IMO as carriage requirement for ship sailing under the SOLAS regulations. Domestic requirements for other vessels such as tugs, fishing vessels, pilot boats, etc. will be seen on several places worldwide. In order to use the AIS functionality in a broader range for shore applications, a shore-based infrastructure has to be established. A shore-based network solution has a great deal to offer various groups of users such as maritime authorities, port authorities, and shipping offices. The AIS eases the communications workload on all parties due to automatic and continuous transmission of ships position, static, and

voyage-related data and by providing means to send/receive text and binary messages. Operators and watch keeping officers can focus on operational and logistical issues. The digital data link for ship-to-shore and shore-to-ship enables real-time monitoring and messaging between mobile stations and shore applications. The shore-based network infrastructure enables distribution of information in a very cost effective manner to mobile stations moving in coastal areas, by using the functionality of the AIS-transponder system. This information can consist of re-broadcast of position reports, navigational data, weather reports, real-time hydrographical data, DGNSS corrections, and port information. The authorities could also, by means of the shore infrastructure, provide fleet and port management services to shipping and transportation agencies by using the precise information existing in the system. In order to better perform these activities efficiently over a broader area, a shore-based infrastructure must exist which can take care of the communications needs between shore and ship-based users. Since 1998, Saab TransponderTech (STT) has developed solutions for a shore-based network that meets the various demands for a network infrastructure consisting of multiple shore users.

Intelligent Waterway System

Various MTS users and stakeholders recognize the need for improvement in information transfer. Because of the diversity of MTS interests, the quick fixes that result are often extremely limited in the type of information transferred, and generally have a specific information provider-information user channel. This "stovepipe" effect is often unnecessarily duplicated. The concept of an Intelligent Waterway System (IWS) is one where information transfer becomes more efficient, accurate, and timely. Recent studies have concluded that development of an IWS for the United States is necessary to keep pace with the continuing growth in the amount of waterborne commerce seen over the past decade and forecast for the future. The U.S. Coast Guard has begun a research effort to improve the efficiency and effectiveness of maritime related functions through the application of information technology. This is being done through the efforts of several projects including automatic identification systems and augmented reality for navigation, as well as interagency efforts.

We propose a network approach, taking advantage of existing Internet technology. To achieve the desired result, we expect to use a Peer-to-peer methodology of distributed content rather than an "information hub." Existing technology allows for content security and limited distribution where necessary to protect sensitive information. A new, content-based mark-up language will be the basis for information transfer and transfer protocol.

The U.S. ENC Program of the Coast Survey

The Office of Coast Survey (OCS), National Ocean Service (NOS) of the United States National Oceanic and Atmospheric Administration (NOAA) is creating a database of digital vector chart data for the production of Electronic Navigational Charts (ENC). Mike Brown's presentation described the ENC program in detail and reviewed the

project's status to date. In doing so, he noted that the ENCs will be in the International Hydrographic Organization (IHO) format as defined in Edition 3.0 of Publication S-57: IHO Transfer Standard for Digital Hydrographic Data. To provide ENC data to mariners and other users in a timely manner, NOS will produce ENCs for the 40 major commercial ports and for private sector companies to use in custom products and services. ENC data will be compiled from original source materials where appropriate to provide the most accurate data available. The ENC database will be kept in continual maintenance (i.e., up to date on a weekly basis), allowing ENC users to obtain vector data sets that contain the most current and accurate information.

Prospect for PORTS

Kathryn Bosley gave a presentation on the Physical Oceanographic Real-Time System (PORTS™), a program of NOS's Center for Operational Oceanographic Products and Services (CO-OPS) that supports safe and efficient navigation by providing ship masters and pilots with accurate, real-time information required to avoid groundings and collisions while, at the same time, maximizing waterway throughput. Beginning in 1991 with the installation of a prototype in Tampa Bay, PORTS™ has developed into a national network. PORTS™ comes in a variety of sizes and configurations, each specifically designed to meet user requirements and to take into account geographic and hydrologic differences between waterways. Today in addition to Tampa Bay, New York/New Jersey Harbor, San Francisco Bay, Houston/Galveston Bay, Narragansett Bay, Los Angeles-Long Beach Harbor, Soo Locks, and Chesapeake Bay are home to full scale operational PORTS™. PORTS™ is a partnership based on extensive collaboration between NOS and local maritime communities to identify and satisfy user needs. Pursuant to congressional direction, CO-OPS oversees the implementation, operation, and maintenance of these systems that are funded by local user organizations.

Linking Risk Assessment of Marine Operations to Safety Management in Ports

Vladimir Trbojevic proposed an approach for developing Integrated Safety Management Systems (ISMS) for managing navigation and other marine operations in ports. The methodology requires that all risks are identified and evaluated, that suitable controls are in place to manage these risks, and that the linkage between risk controls, operating procedures, harbor by-laws, and the management activities is explicitly established. This methodology has been applied to a number of ports in the United Kingdom in compliance with the Port Marine Safety Code requirement. Mr. Trbojevic also discussed an extension of the methodology towards assessing focus and robustness of the ISMS, as well as some ideas about ISMS safety ratings.

SESSION 3 – REGIONAL SEDIMENT MANAGEMENT I

CHAIR
Barry W. Holliday, U.S. Army Corps of Engineers

COORDINATOR
William McAnally, U.S. Army Corps of Engineers

TITLE OF PRESENTATIONS AND SPEAKERS
"The Corps' Regional Sediment Management Research Program" by William McAnally, U.S. Army Corps of Engineers

"Regional Management – Ports Perspective" by Richard Gorini, J. Simmons Group

"RSM Experience and Issues – Vicinity Ponce de Leon Inlet, Florida" by R. Bruce Taylor, Taylor Engineering

"Fine Sediment Dynamics at a Regional Scale" by Ashish Mehta, University of Florida

"Support for Decision Making in Evaluating Proposed Dredging Projects" by Simeon Hahn, Mary Matta, and Alyce Fritz; National Ocean Service, NOAA

SUMMARY
This session highlighted research and technology for improving the MTS by managing sediment resources flowing into and through the navigation system's channels, locks, and harbors. In doing so, it sought to:

- Identify present understanding of managing sediment on a regional scale.
- Identify gaps in research and technology that are needed for effective operation and maintenance of the MTS.
- Foster partnerships between agencies and organizations engaged in understanding and managing sediment resources.

Topics presented at this session include an overview of the Corps's RSM research and development program; technical innovations and tools for better sediment management; and case histories of success stories in beneficial use. Speakers represented a diverse set of interests and organizations, including the private sector and academia.

The Corps' Regional Sediment Management Research Program

Many water resource projects are designed and operated to remedy local sediment problems, sometimes at the expense of creating even larger problems some distance away. Successful project design and operation requires that sediment issues be resolved at both local and regional levels, yet resource managers lack the information and tools needed to make informed decisions. These challenges adversely affect navigation; flood and storm damage reduction efforts; and environmental quality in water resource projects. The U.S. MTS Task Force provided a national vision for MTS 2020, recommending R&D on overall effective sediment management which includes "holistic watershed and local/regional planning efforts." To meet this vision, a

Regional Sediment Management Program is currently being developed to (a) provide knowledge and tools needed for holistic regional sediment management within USACE water resource projects to achieve economic and environmental sustainability, and (b) enable project planning, design, construction, operation, and maintenance that will minimize disruption of natural sediment pathways, or mediate natural processes that have adverse environmental or economic impacts.

Regional Management – Ports Perspective

Richard Gorini serves as Executive Vice President of the J. Simmons Group, a project management consulting firm for the Port of Houston. In his presentation, he showed how dredged material is a resource. Beneficial uses of dredged material were a key element in the Houston Ship Channel deepening project. During the planning stage, an Interagency Coordination Team (ICT) was formed with a top-down commitment to bottom-up solutions. The ICT had twelve members from federal agencies, Texas state agencies, and the Ports of Houston and Galveston. A subgroup, the Beneficial Uses Group, worked to develop a utilization plan for the dredged material. In doing so, they carefully considered the potential environmental, economic, and engineering impacts associated with using dredged materials. They also conducted an outreach to the community, asking how to best improve the project. The end result was a Disposal Area Management Plan that provides a capacity for handling expected dredged material for the next 50 years.

RSM Experience and Issues – Vicinity Ponce de Leon Inlet, Florida

R. Bruce Taylor's presentation addressed three separate programs with inherent yet related sediment management requirements that impact national, regional, and local public interests. The programs include two federally authorized navigation projects, the Intracoastal Waterway (St. Johns Harbor to Miami) and the Ponce De Leon Inlet Navigation project, as well as the State of Florida's Beach Management Program. Initiatives to effect sound regional sediment management for all of these projects has revealed competing project requirements and conflicting federal, state, and local interests.

Dr. Taylor discussed the problems encountered, solutions considered, and actions taken. He outlined several impacts and payoffs for these programs: accomplishment of multiple project/program objectives, the establishment of community support, and the implementation of effective regional sediment management encompassing multiple programs.

Fine Sediment Dynamics at a Regional Scale

Regional examinations of fine sediment transport related problems require development of regional sediment budgets and meso-scale modeling approaches. Delineation of boundaries for sediment budget is easier for the estuarine environment in comparison with the open coast, where the offshore boundary is especially difficult to establish. As a result, our present ability to model open coast transport of fine sediment is rudimentary. The Loxahatchee River estuary on the east

coast of Florida receives sand from the littoral system and fine-grained material from the river tributaries. In order to deal with the problem of excessive sedimentation in the central bay of this estuary, both sand and fine sediment budgets have been developed on a preliminary basis. Through careful suspended sediment flux measurements and bed load trap measurements it is proposed to refine the budgets for an assessment of future needs to manage sedimentation in the central bay. Along the open coast, it appears possible to use known formulations for cross-shore and alongshore fine sediment fluxes to model shoreline changes due to wave action. Comparison between measured changes and diagnostic simulations indicate qualitative agreement; for quantitative prediction considerable additional field data and model development are required.

Support for Decision Making in Evaluating Proposed Dredging Projects

NOAA recently completed an effort to assist the State of Delaware in developing guidance to evaluate proposed dredging projects. The Delaware Statewide Dredging Policy Framework manual covers all aspects of the decision-making process, including economic benefits, potential environmental impacts of the dredging, disposal options, and the potential for beneficial reuses and habitat restoration. The manual was developed in cooperation with the private sector, industry, federal and state agencies, environmental groups, and citizens. The guidance is intended to support evaluations of environmental impacts in support of dredging decisions, and provide suggestions for project designers on modifying projects to reduce environmental impacts. A tiered framework was created to determine how to identify potential effects before dredging (whether literature information is sufficient or whether site-specific sampling would be helpful). Guidance and recommendations for evaluating impacts during dredging operations, and monitoring post-dredging are also provided. The document also provides references to other sources of information useful in the decision-making process and checklists to identify habitat and resources that might be affected.

This effort will improve decision-making in the State of Delaware and will reduce environmental impacts of dredging projects. It also serves as a useful model for other areas by providing a template for discussions with local stakeholders in port and coastal areas throughout the country.

SESSION 4 – INTERMODAL FREIGHT NETWORK SYSTEM

CHAIRS AND COORDINATORS
Robert Bouchard, Maritime Administration

Richard Walker, Maritime Administration

TITLE OF PRESENTATIONS AND SPEAKERS
"Efficient Marine-Rail Interface" by Blair Garcia, TranSystems Corporation

"Port Intermodal Distribution Network" by Bill Ellis, Port Authority of New York and New Jersey

"Inland Agile Port" by Peter Franke, Noell Crane (Germany)

"Intermodal Freight Rail" by William Goetz, CSX Lines

SUMMARY
The theme for this session was to discuss improvements to intermodal systems and networks that will provide more efficient means of cargo movement and ensure cargo security. Recent data shows that over the past three to five years a major pinch-point in the transportation system has been the port or terminal area. This is true from access or egress systems, as well as terminal operations. The session presented some innovative ideas on how to resolve the issues.

Efficient Marine-Rail Interface
The purpose for developing an efficient marine-rail interface is to improve marine terminal efficiency and intermodal terminal efficiency, and the corridors that connect these facilities. Some potential benefits of efficient marine-rail interface and a systemic approach to regional freight infrastructure include, (1) the ability to accommodate both commercial and military freight, (2) added flexibility utilizing marine and intermodal terminals, and (3) an increase in the velocity of cargo through existing transportation infrastructure. An efficient marine-rail interface is part of a larger agile port system. Agile port systems typically consist of five major components: (1) the marine terminal, (2) inland intermodal facilities, (3) freight corridors, whether they are dedicated freight corridors or existing shared use freight corridors, (4) data and information management systems, and (5) system management to tie all the pieces together. An efficient marine terminal has the capability of increasing typical throughput by as much as 100 – 200percent over existing facilities. However, to do this there needs to be an inland intermodal center to accommodate the storage, sorting and dispatching of containers from the efficient marine terminal.

Port Intermodal Distribution Network
The Port Inland Distribution Network (PIDN) focuses principally on moving containers through a port area and to the region that it serves. PIDN is a concept to move containers through the Port of New York and New Jersey (PANYNJ) and the area it serves. Today the port is served principally by truck in terms of inland distribution, with the exception of major railroads like NS and CSX. PIDN offers an alternate system for moving containers inland. Currently the PANYNJ handles about three million TEUs, with a projected 4.2 percent

compound annual growth rate, which will grow to16 million TEUs in the next 40 years. Today about 86 percent of the container traffic moves through the port by truck. The idea of PIDN is to move a substantial numbers of containers inland by rail and barge, rather than by truck. It was realized that many other benefits could accrue, not just to the metropolitan area of New York but the entire larger northeast regional area. The PIDN could stimulate economic development by creation of activity at inland feeder ports where they have been de-industrialized. Also, the ability to, at feeder port locations, construct warehouses that would, in effect, be on the port. In the hub port, warehouses are being demolished to make room for container terminal capacity; yet at feeder ports, they have an opportunity to meet industry needs for warehousing on dock, and that is a significant benefit as well. And, lastly, rail and barge movement offers significant energy conservation and fuel efficiency, especially in comparison to trucks.

Inland Agile Port

On the major containerized trade routes, container shipping is growing by 6-8 percent each year. Container ports in Europe are becoming more congested and ports are trying to find a way to move more cargo via rail. Several years ago there was a government sponsored competition in Germany to develop new methods to sort intermodal rail traffic. A method to replace the existing time consuming sorting yards was being sought. A new idea was developed using shuttle cars and overhead cranes. The new facility is 80 meters wide by 700 meters long. In Europe 700 meters is the maximum length of trains. These trains arrive at the facility every eight minutes. The facility can handle up to six trains at a time. At zero time the first train arrives, after eight minutes, the second, after sixteen minutes, the third, and so on. After 40 minutes, all the trains have arrived. After 20 minutes in the facility the first train departs. Then each of the other trains leave at eight-minute intervals. Within 100 minutes all the loads can be interchanged which is about 360 containers. The system is called mega-hub and uses up to 10 overhead cranes to in parallel to sort from one train to the other. This type of system will help prevent road congestion and fits into smaller land areas than current sorting yards.

Straddle-Carrier Based X-Ray System Manufactured by Noell. This system was developed with an x-ray company called Aero-Core based in California. The U.S Customs Service uses this system at the Port of Miami where operations have been very successful. The carrier passes over the containers, one or two high, and produces a manifest of their contents -- drugs, contraband, explosives, weapons, etc. A patent also exists of an application to detect nuclear materials.

Intermodal Freight Rail

Intermodal involves the movement of trailers and containers on trains. A private sector business, the North American intermodal rail industry is primarily the province of six large Class I railroads. First, intermodal rail is a competitive business because it has no pre-ordained franchise – almost all cargo on the intermodal trains begins and ends on rubber tires (trucks). Truckers could move all the freight if rail was not competitive. Second, this is a very service-oriented business. Whoever

owns the cargo is very anxious to convert it to cash. Third, the intermodal network today is basically the same as 50 years ago. The rail network has gotten smaller as time has gone on. Finally, this is a growth business more freight can be put on rail. How is intermodal competitive advantage created? First, rail is more competitive over longer distance. Second, large train-load volume. The more containers you can put on the train, the lower the unit costs. Finally, the more concentrated the traffic distribution pattern is, the more economical and the more competitive that intermodal move will be.

SESSION 5 – LEVELS OF SERVICE

CHAIR
Patricia Mutschler, U.S. Army Corps of Engineers, Institute for Water Resources

COORDINATOR
Sandra Knight, U.S. Army Corps of Engineers

TITLE OF PRESENTATIONS AND SPEAKERS
"Highway Perspective" by Ray Derr, Federal Highway Administration

"Capacity of Inland Waterways" by David Grier, U.S. Army Corps of Engineers

"Corps LOS Perspective" by Jack Langowski, Planning and Management Consultants, Ltd.

"Port Perspective" by Greg Brubeck, Port of Corpus Christi

"Coast Guard Perspective" by Jorge Arrozyo, U.S. Coast Guard

SUMMARY
The goal of this session was to discuss how various agencies measure Levels of Service for transportation systems. The speakers included Ray Derr of the Transportation Research Board; David Grier of the U.S. Army Corps of Engineers; Jack Langowski of Planning and Management Consultants; Greg Brubeck of the Port of Corpus Christi; and Jorge Arrozyo of the U.S. Coast Guard. The speakers represented a cross-section of the transportation community to include Federal agency proponents as well as users. The session was organized and chaired by Dr. Sandra Knight and Ms. Patricia Mutschler of the U.S. Army Corps of Engineers.

Highway Perspective
Mr. Ray Derr discussed the extensive effort that has gone into the Federal Highway Administration's (FHWA) program for addressing the level of service provided for highways, transit, bicycles and pedestrians. The system used by the FHWA uses a letter ranking, from A through E, to evaluate the capacity of a roadway. A grade of "A" means that there is excess capacity and a grade of "E" means that the roadway just meets capacity. As congestion increases, the rating decreases. Congestion is measured by how crowded the road is, and the speed at which traffic can flow. For transit services, such as busses, a different metric is used. This metric measures the availability of service, the comfort of the service and the convenience of the service. For bicycles and pedestrians, congestion is measured by the number of occurrences that a single cyclist or pedestrian will encounter another user in a given hour.

Capacity of Inland Waterways
Like highways, rail and air traffic, the 12,000 miles of the Mississippi River and tributaries' inland waterways system (IWW) also experience congestion and capacity choke points that cause delays and increase transportation costs. Capacity challenges are poised to increase as commerce continues to grow, while at the same time the system is aging and becoming less reliable. Mr. David Grier discussed the current and future commodities expected on the IWW system of the United States, particularly petroleum, coal, aggregates, chemicals, and farm and food supplies.

Currently, $73 billion of cargo transits the system at an average transportation cost savings of $10.67 per ton in 31 states. The recent discussion of capacity constraints has focused on lock dimensions. Smaller locks necessitate multiple lockages for a single tow. Also, as the capitol stock ages, deterioration causes unplanned closures. In 1999 there were a total of 120,000 hours of unavailability of locks in the system. It is estimated that the system is at 75 percent capacity now and commerce is expected to grow by 33 percent by the year 2020. Without improvements to the infrastructure, growth cannot be realized. Mr. Grier discussed the existing plans to increase the IWW capacity by increasing the size and efficiency of the locks on the waterways. Each lock project costs between $200 million and $1 billion. Two of the nine most constrained locks are being replaced. He also discussed the current backlog of Corps projects awaiting construction and major rehabilitation.

Corps LOS Perspective

Dr. Jack Langowski discussed the ongoing effort by the Corps' Institute for Water Resources to develop a metric for measuring the level of service provided by the various Corps projects. Dr. Langowski traced the history of the effort from its inception with Principals and Guidelines of 1983 through the Operations and Maintenance Program Plan of Improvement of 1993, the Government Performance and Results Act of 1995, the Cost Savings Task Force of 1998, and the Operations and Maintenance Business Information Link (OMBIL) of 1999. Dr. Langowski discussed how navigation projects are evaluated on commodity projections over a projected 50 year project life to determine which project will have the highest projected net benefits and therefore be the expected National Economic Development (NED) Plan to be constructed. However, some projects, once constructed, exceed expected throughput and others fall short. One way to determine the level of service provided by a particular project would be to consistently and frequently update the feasibility analyses performed. However, this approach is time and cost limiting. Other metrics have to be measured to assure that a given project is still performing at an acceptable level to warrant continued public investment. Dr. Langowski discussed the current effort to develop a useful metric for measuring level of service. The team, lead by the Institute for Water Resources, has chosen nine characteristics to explore to develop a more holistic picture of the service provided by an ongoing project. These characteristics include the following: safety, customer requirements, economic performance, operational and physical performance, stakeholder expectations, capacity, policy and political issues, national security issues, and environmental issues. This effort is ongoing and further analysis is required for each composite component, but progress is being made.

Ports Perspective

Mr. Greg Brubeck shared with us his experience as a user of the navigation projects constructed by the Federal government. He addressed the level of service issues that needed to be addressed in the Corpus Christi Harbor. These issues included dredged material management, a narrow channel, a lack of deep water access, a channel that was not deep enough to accommodate future

growth, safety concerns and vessels delays. He spoke about an ongoing planning effort for the Corpus Christi Ship Channel that he has participated in with the Corps district in Galveston to address some of these issues. His experience has been mixed. Initially, he viewed the Corps process as being onerous, long and expensive. As a businessperson he wanted to have the new port constructed as inexpensively and quickly as possible. Through long negotiations, the Corps was able to focus the scope of their effort and streamline their study process significantly enough to meet the needs of the port community. This effort is expected to lead to a constructed project by 2010.

Coast Guard Perspective

Captain Jorge Arrozyo of the United States Coast Guard, Vessel Traffic Management Group, made a presentation addressing a decision making tool used by the Coast Guard to assess the needs and priorities of each harbor in the United States. The goal of the Port and Waterway Safety Assessment is to increase public participation and promote more public and private partnerships. The tool utilizes the Harbor Safety Committee at each port, lead by the Harbor Master, as a users group to identify the specific needs and risks at each port. To date, this process has been completed at 28 ports in the United States. The tool uses a list of questions and asks the group to rank the questions in progressive pairs. A statistical analysis is used to then order the relative rankings of the questions to gain a comprehensive view of the overall needs of the port. This can then be used to set the priorities for the harbor for future development and funding.

SESSION 6 – BALLAST WATER TREATMENT TECHNOLOGIES

CHAIR
John Heisler, Environmental Protection Agency

Dorn Carlson, National Oceanic and Atmospheric Administration

Rich Everett, U.S. Coast Guard

COORDINATOR
Craig Vogt, Environmental Protection Agency

Dorn Carlson, National Oceanic and Atmospheric Administration

TITLE OF PRESENTATIONS AND SPEAKERS
"Shipboard Ballast Water Treatment Tests" by Allegra Cangelosi, Northeast/Midwest Institute

"Ballast Water Treatment on a Cruise Ship" by George Wright, Princess Cruise Lines

"Ballast Water Treatment on MV Cape May" by David Wright, University of Maryland

"Ballast Water Treatment on the Tonsina" by Bill Stubblefield, ENSR Corporation

"Environmental Technology Verification for Ballast Water" by Ray Frederick, Environmental Protection Agency

SUMMARY
As one of its foremost environmental concerns, the MTS report to Congress identified the possible introduction of organisms of invasive species in untreated ship's ballast water. A large variety of different treatment technologies to remove, kill, or inactivate aquatic organisms in ballast have been proposed or tested at the laboratory scale, but fewer have actually been subjected to controlled experiments on ships in actual field conditions. This session was mainly devoted to reports from researchers who had conducted such ship-board experiments. In these experiments, ballast water was treated by physically removing the organisms by filtration or centrifugation, by killing the organisms with ultraviolet light or chemical biocides, and by applying several different treatments in series. Researchers reported on the results of their work, and on the special challenges faced by investigators conducting controlled experiments on a full-scale operational ship. A presentation was also made on the "Environmental Technology Verification" program, a joint EPA-Coast Guard program designed to assist vendors of ballast water technologies in rigorously testing and reporting on the effectiveness of their technologies.

SESSION 7 – ITS TECHNOLOGY AND INFORMATION

CHAIRS AND COORDINATORS
Robert Bouchard, Maritime Administration

Richard Walker, Maritime Administration

TITLE OF PRESENTATIONS AND SPEAKERS
"Regional Information Sharing Systems – Internet Based" by John Lutz, Transcentric Corporation

"Optical Scanning Technology for Marine Gate Systems" by Terry Gibson, Science Applications International Corporation

"X-Ray Technology for Container Inspections" by Vic Orphan, Science Applications International Corporation

"Freight Information Real-Time System for Transport" by Karen Tobia, Port Authority of New York and New Jersey

SUMMARY
The panel addressed and looked at how it can enhance security. Some of the technology is in place, like optical character recognition technology. In talking about technology, the most important thing is how it allows information sharing among partners who do not normally share data, which includes most competing intermodal entities.

Regional Information Sharing Systems – Internet Based
DRMEC is the Delaware River Maritime Enterprise Council (DRMEC). It is a non-profit organization, funded by the State of Pennsylvania. The DRMEC mission is to demonstrate an integrated intermodal transportation data system for Pennsylvania, for the port of Philadelphia and its corridors. This project will have a national scope because it can assist with deployment of data across the supply chain. The goal of DRMEC is to facilitate end-to-end electronic communication and tracking of goods and equipment by data capture. A data center called, Rapid Center, will allow computer systems to talk to each. The center will be able to integrate legacy systems into one common, neutral format that will serve customer needs. Rapid Center is going to be owned and developed by the State of Pennsylvania and run by a trusted third party to provide a neutral platform for data. The Rapid Center will assist with threat detection because it is a centralized, neutral, secure, portal that is will provide reliable, current information.

Optical Scanning Technology for Marine Gate Systems
Early image processing system activities dealt with railroads by reading the numbers on the side of railcars. Images were acquired and 45 minutes later you could see the number most of the time. The early read rates at marine terminals were equally as good, about 32 percent. In 1993, there was a test in Los Angeles and they were never able to achieve more than 50 percent read rate. Of the 50 percent that they actually read, 50 percent was wrong. In Jacksonville a 90-day test in 1994 was able to achieve

about 75 percent read rate. The final number was around 77 percent with a 10 percent error rate. That is still not acceptable. Today, there are significant improvements of the OCR technology. At the UP Railroad facility in Kansas City, Missouri, over a two-year period of development, a read rate of 87 percent was achieved. Now, the average time to complete in-gate and out-gate processes is less than 90 seconds. Eliminating congestion at the gate is one of the advantages of the technology. But, the technology by itself doesn't solve the problem. The OCR is one piece of the overall solution, integrating it with the gate technology. You need to integrate all the necessary technologies, using expert systems with other technologies. Even if you are going to use manual input, you need to be verifying that it is a valid number, that is a usable number, and it is data that fits into your system process.

X-Ray Technology for Container Inspections

An advantage of the VACIS (vehicle and cargo inspection system) is its use of gamma rays. X-rays come from an x-ray tube electrically generated and gamma rays come from an isotopic source. The gamma ray source is a very small pellet, just a few millimeters in diameter, and it is a tungsten-lead shield and it projects a fan-shaped beam. The fan-shaped beam impinges on a linear array of very sensitive sodium iodine detectors. These detectors are only three inches thick, which makes them very efficient – it does not require a lot of gamma ray photons in order to make an image. In fact, unlike x-ray systems, this system can produce an image with approximately 100 times less radiation dose, which is very important because in many of the applications, there are people hidden in the containers – they are not supposed to be there, but sometimes people smuggle themselves or others inside containers. They should not be exposed to high levels of radiation. The dose given to a person inside a container is equivalent to being in an airplane at 30,000 feet for two minutes. The signals from the linear array of sodium iodine detectors are processed with a very simple PC-based workstation and the scanning is very fast. A 40-foot container can be scanned anywhere from 10 seconds to about one minute. Today, there are 30 VACIS systems that U.S. Customs Service bought and about 25 of them are currently operational mostly on the southwest border.

Freight Information Real-Time System for Transport

The concept of FIRST (Freight Information Real-Time System for Transport) is to take information about cargo movement and put it in one place to be accessed by the community that uses it. Next, the waterside information is integrated with the landside information to create a port information management system – a one-stop shopping site. FIRST is not a proprietary system. The Port Authority is leading the effort with money from federal sources and the Port Authority, to build the system. The system uses EDI message sets for the actual bill of lading, status changes, manifests, and that information is sent via flat file (FTP) over the internet. The system also incorporates the Port Authority sea link database of trucking companies and truck drivers. Every trucking company and truck driver has to have a sea link card and be registered in the sea link

system to do business at the port. So, there is a great database of over 35,000 to 40,000 truck drivers that come through the port. FIRST is on the web at www.firstnynj.com. FIRST was officially launched on September 5 and was not affected by the events of the 11th and as a matter of fact, FIRST did become a great source of information. The Port was able to post a lot of information about the port activities, Coast Guard activities, etc. on FIRST almost immediately and we have been continuing that. A registered carrier or a shipper or broker could actually go into FIRST and nominate a trucking company for a particular container. The nominated trucking company has the ability to actually go in and assign the driver through the sea link database. Then the carrier and the terminal can know who the driver is going to be for that particular load. All registered users have the ability to create watch lists where they would just enter a container that they are watching for status changes and the screen refreshes every 30 seconds and it constantly updates as the data is coming in.

SESSION 8 – ENVIRONMENTAL ISSUES

CHAIR
Jean Snider, National Ocean Service, NOAA

COORDINATOR
Richard Legatski, Legislative Affairs, NOAA

TITLE OF PRESENTATIONS AND SPEAKERS
"TRANSMAP: An Integrated Real-Time Environmental Monitoring and Forecasting System for Highways and Waterways in Rhode Island" by Malcolm Spalding, University of Rhode Island

"Hawaii Pilot Project to Build a National Early Warning System for Invasive Species" by Donna Turgeon, Michelle Harmon, and Gary Matlock; National Ocean Service, NOAA

"Key Environmental Issues in a Sound MTS Strategy" by Tom Chase, American Association of Ports Authorities and Tom Bigford, NMFS, NOAA

"Monitoring of Hydrodynamics, Sediment Transport, and Water Quality in the Port of New York / New Jersey: Preliminary Results" by Michael Bruno, Stevens Institute of Technology; Kelly Rankin, Stevens Institute of Technology; Frank McDonough, Nation's Port; and Robert Chant, Rutgers University

SUMMARY
TRANSMAP: An Integrated Real-Time Environmental Monitoring and Forecasting System for Highways and Waterways in Rhode Island
Malcolm Spalding provided a presentation on TRANSMAP (Transportation Mapping and Analysis Program), an integrated, real-time environmental monitoring and forecasting system for highways and waterways in Rhode Island. The resulting environmental data is critical for effective operation, management, and evaluation of various land and marine transportation systems. Selected data and model products will be available to the public and transportation user groups through the internet.

Hawaii Pilot Project to Build a National Early Warning System for Invasive Species
In her presentation, Donna Turgeon outlined the details behind the Hawaii Pilot Project to build a national early warning system for invasive species Once implemented, this project will provide managers and scientists with the ability to assess the risk of coastal exotic species becoming invasive, impacting native wildlife, and natural ecosystems, as well as economic and human health. In doing so, it has two main objectives: (1) identify the occurrence of exotic species as early as possible, and (2) quantify possible risks of exotic species. The complications for this project include a lack of consensus on hardware platforms, operating systems, network protocol, and data format. She stressed that, in order for this project to succeed, there must be a consensus on interoperability and an infrastructure to support it. The system should prove extremely beneficial in providing automatic alerts for exotic/invasive species, GIS maps, ecological forecasts, and many other products.

Key Environmental Issues in a Sound MTS Strategy

Research and technology issues are very important to the environmental side of MTS. NOAA's ability to provide environmental services hinges on solid scientific information, but that essential basis for technical comments, consultation decisions, and environmental advice is often lacking. Business decisions based on incomplete knowledge pose economical, litigation, and ecological risks.

Key research needs include information on the life history and ecological needs of species occupying ports, harbors, and transportation corridors; specific information on migratory species whose occasional visits could offer solutions to scheduling challenges; and improved knowledge about animal behavior to predict the reaction of marine mammals, sea turtles, fish, and other species to underwater noise, turbidity barriers, hydrologic change, and other environmental alterations.

Key technology needs include careful consideration of the interplay between vessel designs, port configurations, and potential impacts to NOAA trust resources. In some ports, shallow-draft vessels could obviate the need for recurring maintenance dredging. Greater use of technology could narrow tolerances for dredging, thereby reducing the need to "over-dredge" for safety considerations. Technology can also help with environmental monitoring to track sediment plumes, water chemistry, and other basic factors that may improve confidence in our decisions.

Much of this relates to the on-going debate about the use of regulatory "windows" to dictate when dredging and other activities can occur or should be avoided. Improved information and full application of that information in an acceptable manner (risk averse, economically feasible, politically justifiable, etc) might offer more flexibility than the MTS community now enjoys when scheduling in-water projects.

As long as these types of R&T needs remain, efforts to streamline decision making will be frustrating. With sufficient information, more efficient permit review procedures and reasonable expectations can yield improved predictability to the MTS community.

Monitoring of Hydrodynamics, Sediment Transport, and Water Quality in the Port of New York / New Jersey: Preliminary Results

The annual maintenance dredging requirement in New York Harbor is almost four million cubic yards. Authorized deepening projects, some of which are now underway, will raise the requirement for disposal of dredged material to more than 150 million cubic yards over the life of the projects. However, it is no secret that the silty material, which makes up much of the harbor's bottom, is encumbered by a complex mix of contaminants resulting from historic and current pollution sources. This contamination drastically limits disposal options for dredging projects. To meet the challenge of managing this material, the region, and particularly the State of New Jersey, has adopted a tripartite approach to dredged material management. First the State of New Jersey declared that beneficial use

of dredged materials shall be the preferred disposal option; and has developed a number of uses for these materials such as brownfields remediation. Second, the state along with the federal agencies, funded and oversaw the development of a number of innovative technologies for decontamination, processing, and use of dredged material, and for the reduction in siltation. Finally the state, along with the State of New York, embarked on a toxics trackdown program designed to identify and eliminate the sources of contamination. This latter program, for which more than $30 million has been dedicated by the two states, is operated in conjunction with the Harbor Estuary Program for New York Harbor (HEP) and is a major component of the HEP Contaminant Assessment and Reduction Program (CARP). Tom Bigford's presentation focused primarily on CARP.

In New Jersey, hydrodynamic and water and suspended sediment quality studies are underway in Newark Bay, the Arthur Kill, and Kill van Kull. This work is coordinated with water and sediment quality sampling studies undertaken at the head-of-tide and within the tidal reaches of the major New Jersey tributaries that discharge into the NY-NJ Harbor. The goal of these synoptic studies is to develop an understanding on the contaminant transport pathways within this region of the estuary. The program uses a combination of three (3) fixed mooring stations, shipboard measurements at specified locations, and shipboard transects throughout the area. Measurements include current profiles using a towed Acoustic Doppler Current Profiler; conductivity-temperature-depth measurements using a CTD system; measurements of turbidity using an Optical Backscatter Sensor; measurements of suspended sediment concentration and particle size spectrum using a laser-based scatterometer; and water and suspended water quality measurements using Trace Organic Platform Samplers (TOPS) and grab sampling devices. Preliminary analysis of the data collected over the past year indicates that the Newark Bay/Kills system is influenced by several types of forcings, including tide, wind, and freshwater inflow. These highly variable forcings are responsible for dramatic variations in hydrodynamic and sediment transport characteristics, including for example, the connectivity of the system with the Hudson River. These transport characteristics play a significant role in determining the fate of sediment and water-borne contaminants in the Harbor. The presentation described the measurement program and data analysis, and offered preliminary conclusions regarding the dominant transport processes – and links to contaminant transport – within the Newark Bay/Kills system.

SESSION 9 – REGIONAL SEDIMENT MANAGEMENT II

CHAIR
Barry W. Holliday, U.S. Army Corps of Engineers

COORDINATOR
William McAnally, U.S. Army Corps of Engineers

TITLE OF PRESENTATIONS AND SPEAKERS
"Understanding Geologic Framework and Processes of Coastal Sedimentation Systems" by Jeff Haines, U.S. Geological Survey

"Candidate Eutrophication Models for TMDL Analyses in Support of the Clean Water Act" by Robert Carousel, Environmental Protection Agency

"Atchafalaya River and Mississippi River Gulf Outlet – Navigation Issues" by Tonja Koob, U.S. Army Corps of Engineers

"Maintaining Reliable Navigation Channels While Altering Alluvial Processes" by John Remus, U.S. Army Corps of Engineers

SUMMARY
Many water resource projects are designed and operated to remedy local sediment problems, sometimes at the expense of creating even larger problems some distance away. Successful project design and operation requires that sediment issues be resolved at both local and regional levels, yet resource managers lack the information and tools needed to make informed decisions. These challenges adversely affect navigation, flood and storm damage reduction efforts, and environmental quality in water resource projects. The U.S. MTS Task Force provided a national vision for MTS 2020, recommending R&D on overall effective sediment management which includes "holistic watershed and local/regional planning efforts." To meet this vision, a Regional Sediment Management Program is currently being developed to (a) provide knowledge and tools needed for holistic regional sediment management within USACE water resource projects to achieve economic and environmental sustainability, and (b) enable project planning, design, construction, operation, and maintenance that will minimize disruption of natural sediment pathways, or mediate natural processes that have adverse environmental or economic impacts.

Topics presented at this session included technical innovations and tools for better sediment management, and case histories of success stories in beneficial use. Speakers represented a diverse set of interests and organizations, including USACE and other federal agencies. The topics regarding the research and development and application of new technologies represent multi-agency efforts.

Understanding Geologic Framework and Processes of Coastal Sedimentation Systems
John Haines presented examples from USGS geologic mapping and research programs to provide a regional understanding of sediment distribution, transport, and evolution of coastal and nearshore systems. Results from both the Pacific and Atlantic coasts contribute to

our understanding of the linkages between inner shelf, nearshore/coastal, and river mouth deposits. He discussed developments in process understanding and modeling capabilities, as well as the implications of regional sedimentary systems on a variety of issues including shoreline erosion and habitat maintenance.

Candidate Eutrophication Models for TMDL Analyses in Support of the Clean Water Act

The Clean Water Act §303(d) requires the development of Total Maximum Daily Loads (TMDLs). The provisions provided in this act require each State to produce and provide the U.S. Environmental Protection Agency with a list of waters where water quality standards are not being attained, to prioritize the development of TMDLs for the water bodies that will result in attainment of standards, and to develop and implement the TMDLs. A TMDL is an estimate of the maximum pollutant loading from point and nonpoint sources that receiving waters can accept without exceeding water quality standards. A primary environmental focus for TMDLs is the use of models for characterization of sources of nutrients and sediments and their relative loadings from the river basins, and the role of nutrients/sediments from sub-basins on water quality in rivers, lakes, and estuaries for impacts such things as excessive algal blooms, low dissolved oxygen, and related fish kills. Nutrient TMDLs that warrant a detailed characterization and assessment of receiving water bodies in many instances require the use of an eutrophication model. A methodology is presented by which seven water quality models were identified as candidates for use in developing TMDLs for nutrients and sediment.

A case study was conducted to identify/evaluate receiving water quality models that provide a means to evaluate nutrient (i.e., nitrogen, phosphorus, or carbon) cycling by considering water-quality based variables and processes for Total Maximum Daily Load assessments. A large (80) number of water quality models were evaluated by searching and documenting the sources of information for science, criteria for model documentation, usage and technical support, software architecture, and nutrient (i.e., nitrogen, phosphorus, carbon) cycling. Based on a screening process developed in previous work, seven models satisfied the minimum requirements imposed by the pre-screening. This research presents the results of the first of two detailed model evaluations in the form of comparison matrices and explanatory text of the seven water quality models selected for use in TMDL assessments and potential linkage to watershed overland flow and transport models. Comparisons are made to hydrodynamic, sediment, water quality constituent capabilities, auxiliary model application tools and comparisons of usage, application and support. Model comparisons for each element used a two-tiered approach. First, *all* models have been compared head-to-head using general criteria. Afterwards more subtle differences between *similar* models (e.g., 3-D models) have been identified and documented using more specific criteria.

Future plans include a detailed model evaluation of eutrophication capabilities by comparing their differences from four systems including plants (phytoplankton,

periphyton, and macrophytes), the nitrogen cycle, the phosphorus cycle, the carbon cycle and dissolved oxygen balance.

Atchafalaya River and Mississippi River Gulf Outlet – Navigation Issues

The Mississippi River and two of its distributaries, the Atchafalaya River and the Mississippi River Gulf Outlet, are all major navigation channels through estuarine environments maintained by the New Orleans District of the Corps of Engineers. Each channel experiences riverine, estuarine, and coastal processes as it empties into the Gulf of Mexico. Despite their similarities, each channel has different sediment issues that directly impact navigational activities. At one extreme, the Atchafalaya River navigation channel courses through an actively building delta requiring frequent maintenance and advance maintenance dredging to keep it open to project depth. At the opposite extreme, the Mississippi River Gulf Outlet is experiencing tremendous wetland loss and habitat destruction primarily from the ship traffic traveling through that channel. The Mississippi River, geographically located between its two distributaries, experiences both land creation and land loss, depending on the time of year and local weather patterns. Because of the complex nature of sediment management along coastal Louisiana, new and innovative research approaches are needed for effective operation and maintenance of these estuarine navigation channels. Tonja Koob's presentation provided an overview of the navigation issues and addressed those gaps in current research and technology.

Maintaining Reliable Navigation Channels While Altering Alluvial Processes

The Missouri River from Sioux City, Iowa to the mouth, a distance of 734 miles, has been narrowed and straightened by the Corps of Engineers. The banks have been fixed in-place through a series of revetment and transverse dikes. Discharges upstream of Sioux City are controlled through a series of dams. Two of the results of this development have been the elimination of the natural depth diversity and the loss of the upstream sediment supply that has contributed toward incision at several locations along the Missouri River. The loss of depth diversity has benefited navigation, but has lead to the listing of a number a species as threatened or endangered. The channel incision negatively impacts the environment, but also hinders navigation as loading facilities become farther from the waters edge. John Remus's presentation provided an overview of the concepts implemented and/or proposed to date an assessment of the relative risk associated with each concept, and a listing of technology gaps.

SESSION 10 - FERRIES

CHAIR
Richard Lolich, Maritime Administration

COORDINATOR
Michael Gordon, Maritime Administration

TITLE OF PRESENTATIONS AND SPEAKERS
"Vessel Wake and Other Issues Facing Ferry Operators" by James Bamberger, Maritime Institute of Technology

"Challenge and Opportunities in Financing Ferry Boats and Operations" by Clayton Cook, Management and Transportation Associates

"Ferry Vessel Design Which Creates Little or No Wake" by Bill Burns, Mangia Onda Company

"Pre and Post September 11th Impact/Importance of Ferry Transportation in the New York Area and Technological Needs from the Customer's View" by Roberta Weisbrod, Partnership for Sustainable Ports

SUMMARY
The Role of Ferry Transportation.
There are about 225 ferry operators in the U.S., serving 487 routes with 677 vessels. Each year more than 113 million passengers and 32 million vehicles are carried by these ferries. In fact, ferries carry more than four times as many passengers annually than AMTRAK. It is interesting to note that ferries serve 43 states and territories of the U.S. These ferry operators serve a variety of markets. Some are major components of the metropolitan transportation systems in places like Boston, New York, San Francisco and Seattle. Some provide essential links to the many islands along the East and West Coasts as well as on the Great Lakes or the Gulf Coast. Others provide vital links on low volume roads in rural areas that cannot justify the expense of a new bridge or tunnel based on their traffic volumes.

Four of the most congested metropolitan areas in the country have extensive ferry operations that could be expanded. Tourism is one of the fastest growing industries in the U.S. and a significant number of sites served by ferries are places that people like to visit. A good example is the 55 routes that serve various elements of our National Park system.

Ferries have also provided a vital role during natural disasters. When the Loma Prieta earthquake struck San Francisco and shut down the Oakland Bay Bridge, ferries provided a critical service linking East Bay communities to San Francisco. North Carolina also relies on ferries to evacuate residents on coastal islands during the hurricane alerts. Everyone is also familiar with the massive evacuation role which the New York area ferries played on September 11, 2001 and afterward. Without these ferry services, there may well have been many more injuries and lives lost.

The Problem of Congestion.
As the traditional surface transportation modes (rail and highway) become increasingly congested, they will be challenged in meeting the transportation needs of a growing U.S. economy or of sustaining the international trade vital to

that growth. Left unchecked, increasing congestion on our highway and rail networks will lead to spreading gridlock and ultimately to economic stagnation (if not meltdown). Symptoms of these problems are with us today, from accidents that tie up local interstates for hours, to major events such as occurred in the Houston area following the UP-SP merger.

Both intercity and metropolitan ferry operations can help alleviate this congestion. There are several major transportation/population corridors which also have parallel water routes that could be exploited or expanded to accommodate some of that additional congestion. Among them are the San Francisco Bay, Buffalo-Cleveland, Cleveland - Detroit, Buffalo - Rochester, Chicago - Milwaukee, Southern Connecticut - New York City, and Mobile, Alabama - New Orleans - Houston. These routes are not being used at capacity and could provide an overall low cost transportation alternative to the congested roads and rails in those areas.

Many of our existing ferry terminals are located within our largest and busiest ports, where ferries compete with large containerships and bulk carriers for waterway access. In those ports where must be closer coordination between the cargo and passenger carriers as well as the port authorities to ensure that the passenger segment (ferries) employs adequate security measures throughout there operations. At the smaller terminals, where there may not be a port authority or other public agency, appropriate security measures need to be developed to assist the operators.

Some of the critical security ferry issues that need to be addressed are:

- How to adequately screen the more than 113 million passengers carried on ferries each year
- How to properly inspect the more than 32 million vehicles carried on ferries each year - vehicles carrying a wide variety of fuel types
- How to coordinate security measures with the ferry operators and the local port authorities

Potential Barriers

There are a number of issues that could impede new or expanded ferry services. Among them is the difficulty encountered in trying to build new terminals. Local opposition to new terminal sites usually focuses on the traffic impact associated with passengers arriving at the terminal by car. Another problem in siting terminals is that the availability of new sites for terminals is becoming increasingly limited as the waterfronts are redeveloped and the cost of those sites that are available is rapidly rising.

One of the biggest issues is funding. Ferries are supported by both public and private funds. Of the approximately 225 operators, only about 89 receive public funds from either the federal, state or local governments or from a combination of the three. Although there are more federal funds available now than prior to TEA-21, operators cite a number of difficulties in accessing these funds. Projects must first be on an approved state or metropolitan plan and program. Aside from the Ferryboat Discretionary Program, ferry projects must compete with other transportation

needs for available funds. Some operators are not familiar with these ongoing planning processes and as a result they are unlikely to be as successful as other players.

Ferry transportation is a vital component of our Marine Transportation System, and must be integrated into the Nation's overall transportation planning process. Faster vessels and propulsion systems which produce lower air emissions must be built. Secretary of Transportation Norman Mineta recently stated that "Ferries reduce passenger and freight congestion." We must ensure that they continue to play that very important role in our Nation's transportation system.

SESSION 11 – CONTAINER ON BARGE: PROBLEMS, PRACTICAL AND POLITICAL

CHAIR
Bill Ellis, Port Authority of New York and New Jersey

COORDINATOR
Jim McCarville, Port of Pittsburgh

TITLE OF PRESENTATIONS AND SPEAKERS
"Stream-of-Commerce Container Study" by Robert Holliday, U.S. Customs Service

"Calculating the Public Air Quality Benefits of Private Container on Barge Movements" by James Corbett, University of Delaware

"How One State Looks at Air Quality and Maritime/Container on Barge Issues" by Bill Jordan, Texas National Resource Conservation Commission

"Operational Issues Initiating a Container on Barge Service" by William Edwing, Osprey Lines

"Discussion: Devising a Research Strategy for Container on Barge" by Jim McCarville, Port of Pittsburgh

SUMMARY

Stream-of-Commerce Container Study
To accommodate a scheduling complication, the panel opened with an interesting presentation by Robert Holliday, U.S. Customs Officer, regarding the tracking of containers between the U.S. and Canada. This technology will also be very useful for containers moving in the coastwise and inland river trade.

Calculating the Public Air Quality Benefits of Private Container on Barge Movements
As a researcher and professor at the University of Delaware, James Corbett presented research indicating that savings in air emissions could be accomplished under certain container on barge services, but not necessarily all. He laid out a methodology to examine the relative advantages, as well as the advantages of certain clean burning new engines.

How One State Looks at Air Quality and Maritime/Container on Barge Issues
William Jordan presented the perspective of the regulatory battles in south Texas that looked at Container on Barge as a solution to the movement of cargo. He reviewed the pros and cons that were present in the debate as well as how Texas looked at solutions to those issues.

Operational Issues Initiating a Container on Barge Service
As an operator engaged in the Container on Barge business in the Gulf Intracoastal Waterway, William Ewing presented the operational considerations and advantages that led to the successful business operations of Osprey Lines, Inc. in moving containerized cargo on barges in and out of the Houston hub. His statistics surprisingly could beat road and rail traffic in certain markets.

Discussion: Devising a Research Strategy for Container on Barge
James McCarville presented the efforts of the Port of Pittsburgh to help organize

container on barge markets, including the SmartBarge.com marketing tool to electronically link potential shippers and carriers.

SESSION 12 – NAVIGATION AND INFORMATION SYSTEMS II

CHAIR
Andrew Silver, Naval Surface Warfare Center, Carderock Division, United States Navy

COORDINATOR
Siraj Khan, U.S. Customs Service, Department of Treasury

TITLE OF PRESENTATIONS AND SPEAKERS
"Ship Performance Measurements—Houston Ship Channel, Galveston Bay, Texas" by Larry L. Daggett, Waterway Simulation Technology, Inc.

"Entrance Channel Design Tool" by Andrew Silver, U.S. Navy and Zeki Demirbilek, U.S. Army Corps of Engineers

"Next Generation of Navigation Aids Research (NGEN NAV)" by Walter Heerlein, Rich Hansen, and Ric Walker; U.S. Coast Guard Research and Development Center

"Integrated Marine Communications – A Tool to Improve Vessel Management" by James Tindall, MariTEL and Ronald Gaynor, Harris Corporation

"Automated Commercial Environment (ACE): Business and Technology Benefits" by Charles Armstrong, U.S. Customs Service

SUMMARY
This was the second of two technical sessions dedicated to Maritime Navigation and Information Systems. The five papers presented at this technical session focused on the dynamics of deep draft ships in shallow and narrow entrance channels, improvements to the Coast Guard's navigation aids, ship to shore communications, and new devices and procedures to aid the Customs service track cargo.

<u>Ship Performance Measurements—Houston Ship Channel, Galveston Bay Texas</u>
There were two papers that investigated the motions of ships in narrow and shallow channels. The first paper by Waterway Simulation Technology Inc. looked at vertical and horizontal ship motions in the Houston Ship Channel, and documented the relevant environmental and ship control factors that influence the ship motions. The ships chosen for this study were tankers, container ships. Ship position and motion measurements were obtained by Differential Global Positioning Satellite (DGPS) receivers. The ships were instrumented with potentiometers and cameras to record the engine RPM and rudder position to collect data on maneuvering and controllability. Water level data were obtained from NOAA's PORTS system and the water current data were obtained by an Acoustic Doppler Current Profile (ADCP). Vertical and horizontal ship motion data were collected for twenty-five ships that made transits of the channel. The next step will be to further process and analyze the data.

Entrance Channel Design Tool

The other paper on ship dynamics was presented by the Naval Surface Warfare Center, Carderock Division (NSWCCD) described collaborative work NSWCCD was undertaking with the U.S. Army Corps of Engineers to provide a channel design tool based on underkeel clearance. NSWCCD has developed an operational entrance channel guidance system, the Environmental Monitoring and Operator Guidance System (EMOGS), that predicts the underkeel clearance of a deep draft ship in shallow entrance channels based on real-time environmental data of waves and water level. This system has been operating for 13 years at two locations. The purpose of this project is to convert EMOGS into a channel design tool based on underkeel clearance. Work is just beginning on this project. Once the channel design tool is completed, the U.S. Army Corps of Engineers will use field data collected with ships will be used to compare, calibrate the design tool and validate the assumptions associated with the tool.

Next Generation of Navigation Aids Research (NGEN NAV)

The Coast Guard Research and Development Center presented their ongoing research in the area of aids to navigation. The Coast Guard's interpretation of the next generation navigation systems were presented and compared to today's products. The main drivers for developing new products is cost savings, increased information for the maritime community, and increased safety. Many of the new aids to navigation will be taking advantage of augmented reality. This is the expanded knowledge of ones environment with useful layers of information. The plan is to develop a technology roadmap for next generation navigation aids, fill in the research and development gaps, and partner with industry and stakeholders to achieve this paradigm shift.

Integrated Marine Communications – A Tool to Improve Vessel Management

Next MariTEL and Harris Corporations presented their Integrated Marine Communications System. They described the conception, design, construction and implementation of the integrated voice, data and vessel tracking communications network. This network supports automatic voice and data calling from ship-to-shore, shore-to-ship, and ship-to-shore-to-ship. The network's security for this communication resides in a Network scrambling protocol that makes the conversations and data communications private. Department of Defense encryption can also be handled on the network. The current status is that real-time positioning information and ship-to-shore-to-ship calling is available in the Gulf of Mexico and up the Mississippi River to Memphis, Tennessee. Eventually, this system will be operational nationwide.

Automated Commercial Environment (ACE): Business and Technology Benefits

The U.S. Customs Service of the Department of Treasury described their modernization objectives to replace the Automated Commercial System with a new Automated Commercial Environment (ACE). The new program system will track imports and process them more efficiently by automating transactions, provide national views of importer activity for compliance purposes and increase flexibility. The

new ACE will enhance national security by using relational databases to track cargo, ships, trucks, planes, and crews before port arrival. This will provide a national perspective for enforcement violations, and provide support for sharing information among other government agencies nationwide. ACE will also be using the Internet, wireless communications and Artificial Intelligence to process information. The system is being developed in four stages and two release versions.

V. POSTER SESSION

PAPERS

"Oceanographic Model Forecast Systems: Economic Benefits for the Marine Transportation System" by Bruce Parker, National Ocean Service, NOAA

"Navigational Aids User Survey" by Ric Walker and Kathleen Shea, United States Coast Guard Research and Development Center

"Houston Ship Channel Hydrodynamics: Measurement and Modeling Perspective" by Richard Schmalz, National Ocean Service, NOAA

"Application of Multi-beam Echosounder Systems to Habitat Delineation" by Bob Pawlowski and Jerry Wilson, Thales GeoSolutions

SUMMARY

A poster session ran for the entire length of the Conference in the main hall of the National Academy of Sciences building. It consisted of four technical papers, all of which were related to Navigation and Information Systems, although the fourth paper dealt with the application of data usually obtained for navigation information systems to ecosystems, and so is related to the technical session on Environmental Issues.

Oceanographic Model Forecast Systems: Economic Benefits for the Marine Transportation System

In the last decade real-time oceanographic data systems, which provide real-time water levels (for determining underkeel clearances for commercial shipping) and current fields (for improved ship maneuvering), have become common in the world's ports because of their importance to safe navigation and the prevention of accidents. Bruce Parker described in this paper how these systems when combined with a forecast capability can also make an important contribution to maritime efficiency and port throughput, while also helping to protect the marine environment as an important side benefit. Sophisticated oceanographic model systems, driven by weather forecast models and river inputs, can provide 24-hour or longer forecasts of water levels and 3-dimensional current and density fields, which can be used to determine optimum loads for ships leaving port and optimum arrival times for ships arriving in port. The detailed current fields produced by the model systems can also be used to better predict the trajectory of hazardous spills leading to more efficient clean up. The Coast Survey Development Laboratory in the National Ocean Service, NOAA, presently has forecast model systems operating in Chesapeake Bay, the Port of New York and New Jersey, and Galveston Bay, with others being developed.

Navigational Aids User Survey

In this paper Ric Walker and Kathleen Shea described the Aids to Navigation (AtoN) User Survey, which was developed to gather information on user preferences for navigational aids as electronic navigation becomes more prevalent. The intention is to develop new information, methods, and tools to support the AtoN program manager in determining future AtoN System requirements and related program

policies and strategies. This was in response to the Coast Guard's need to take a fresh look at the entire aid system mix (aids to navigation and navigational aids) and determine the types of visual, auditory and electronic systems that are necessary today and in the future to enhance mobility and safety on the waterways, while reducing the cost of the aids to navigation program. An interactive, web-based survey instrument was developed, and a pilot survey of mariners was conducted in the Tampa Bay area during FY2000. Over 3000 individuals were contacted resulting in nearly 700 survey responses. The survey responses have been analyzed, and a final report is available. The results provide a better understanding of current user preferences at a point when navigational technology, which relies heavily on short-range (visual) aids to navigation, is evolving to a future state in which electronic navigation systems predominate. This effort will be linked to research on the Next Generation NavAids and Intelligent Waterway Systems. A broad application of the survey would provide the Coast Guard's AtoN Program manager with better information on which to base decisions regarding future AtoN systems and policies. This should ensure that user requirements are met, navigational safety and mobility are enhanced, and opportunities to adjust the mix of systems for potential cost savings are fully evaluated.

Houston Ship Channel Hydrodynamics: Measurement and Modeling Perspective

Richard Schmalz described a project that focuses on the measurement and modeling of the vertical density and current structures and water surface elevation slopes along the Houston Ship Channel in support of safe navigation. A nowcast/forecast model system for Galveston Bay, with a fine-resolution Houston Ship Channel model embedded in it, was developed to supplement the Physical Oceanographic Real Time System (PORTS) installed in the Bay by the NOAA's National Ocean Service (NOS). This system has been used to provide a daily 36-hour forecast, initiated from a nowcast based on the previous 24 hours of real-time data and using both bay and channel models in a pseudo-operational setting since April 1999. To seek improvements in the prediction of the current and density structure, a joint NOS-Sea Grant sponsored current and salinity/density survey of the Houston Ship Channel was conducted in September 1999. Results from the towed ADCP/CTD survey were analyzed and compared with the nowcast/forecast model system results. Based on the comparisons the following additional modeling and measurement tasks have been identified: 1) improve model vertical coordinate, 2) improve model grid generation for navigation channels, and 3) improve current, salinity and temperature measurement strategy in conjunction with potential PORTS expansion activities. The improved forecasts of water levels, currents, and density are expected to improve the efficiency of navigation to and from the ports of Houston and Galveston.

Application of Multi-beam Echosounder Systems to Habitat Delineation

In this paper Bob Pawlowski and Jerry Wilson described how multi-beam echosounder (MBES) systems are enabling detailed bathymetric surveys of coastal and offshore features. Through a combined approach utilizing the MBES

and psuedo-sidescan backscatter data, a detailed interpretation of the seabed can also be made. The results of these interpretations can provide the basis for addressing environmental questions with waterway improvement and waterway management. Examples of MBES surveys from coastal California and Alaska were described in the paper, including surveys off Morro Bay, California, in the Gulf of Alaska, and in Glacier Bay National Park. Data collected are being processed for enhanced digital terrain models (DTMs) and mosaics, allowing interpretation of bottom types and geologic features. Additional surveys are being planned in support of Marine Protected Areas, Essential Fish Habitat, and to document specific coastal development concerns. Evolving processing procedures are enabling more refined analysis of psuedo-sidescan data and the backscatter component. The enhanced DTMs and mosaics will provide benefit to waterway planners and managers in determining the appropriate approach to waterway development while sustaining habitats and resources associated.